

GPS Status and Results for the 2003-2004 AASI Campaign

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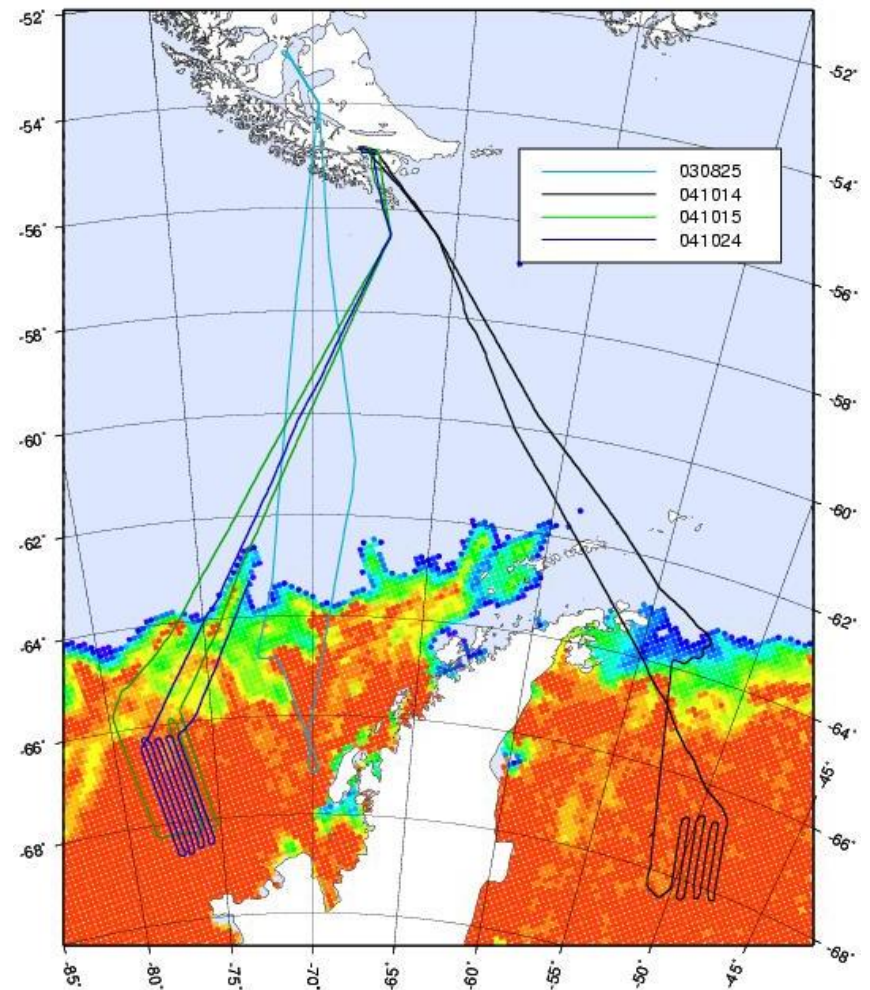


Reduction of GPS Data

- Step 1: Initial QA and archiving in the field
- Step 2: Determination of ground station position
 - *JPL/Gipsy software in point-positioning mode*
 - *Resulting position accurate to 1-2 cm in height*
- Step 3: Detailed editing of ground and aircraft mission data
 - *Form geometry-free linear combinations of dual-frequency data types (L1, L2, P1 and P2)*
 - *Screen time series of these combinations for discontinuities*
 - *Repair cycle slips if possible, delete data only where absolutely necessary*
- Step 4: Precise trajectory computation
 - *Phase ambiguity determination*
 - *Modeling and estimation strategy for tropospheric refraction*

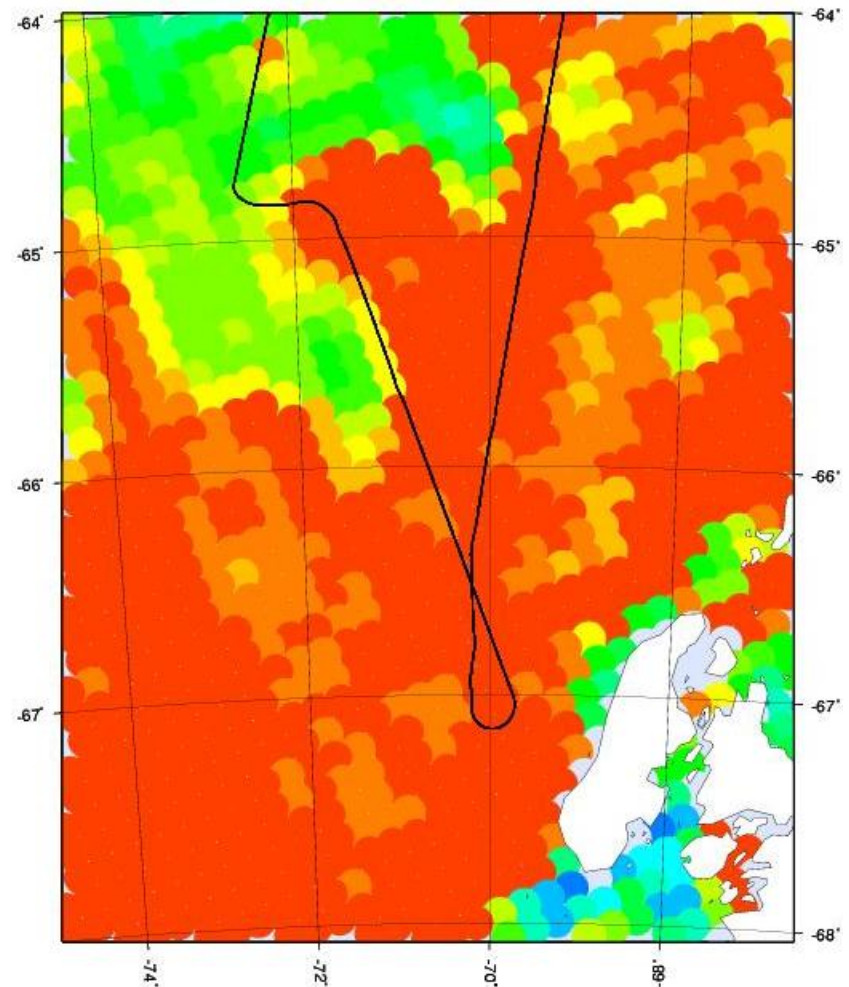
Overview of the Four Flights

- AMSR-E sea ice concentration from 041021
- Differing altitudes
 - 030823 *high*
 - 041014 *high*
 - 041015 *low (300 m)*
 - 041024 *high*
- Maximum baselines ~ 1500 km
- Expect height accuracies of 20-30 cm



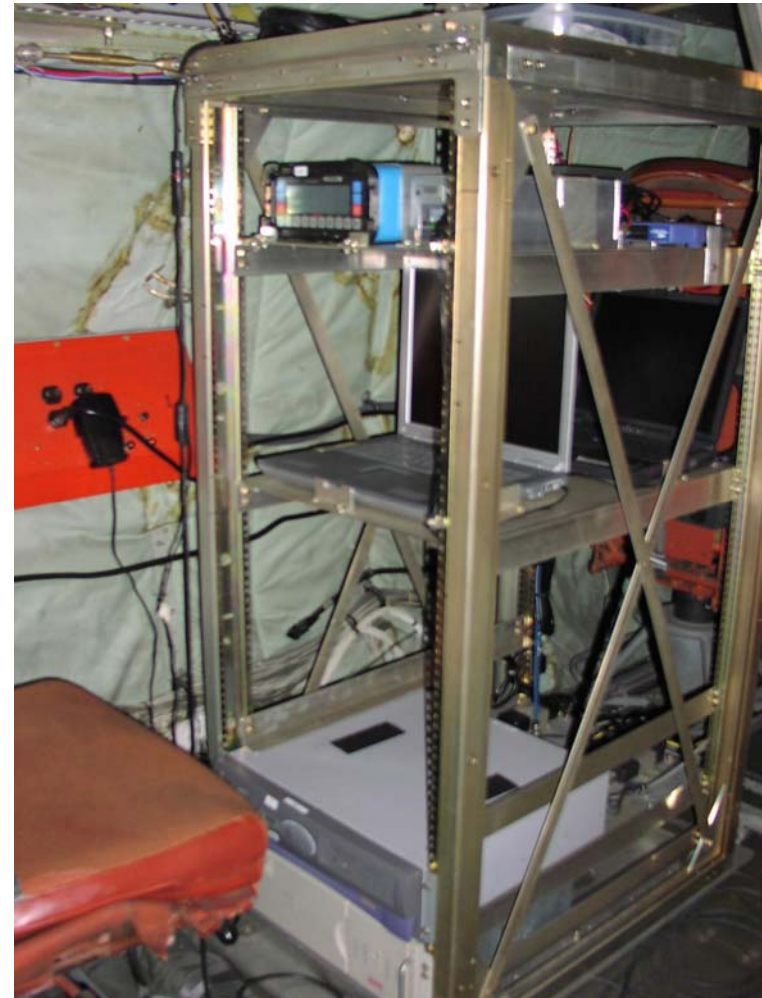
030825 Flight

- Mission aborted after single 30-minute line
- High confidence in precise trajectory
 - *Good satellite geometry throughout*
 - *Very clean raw data*
- No gaps!
- No further work needed



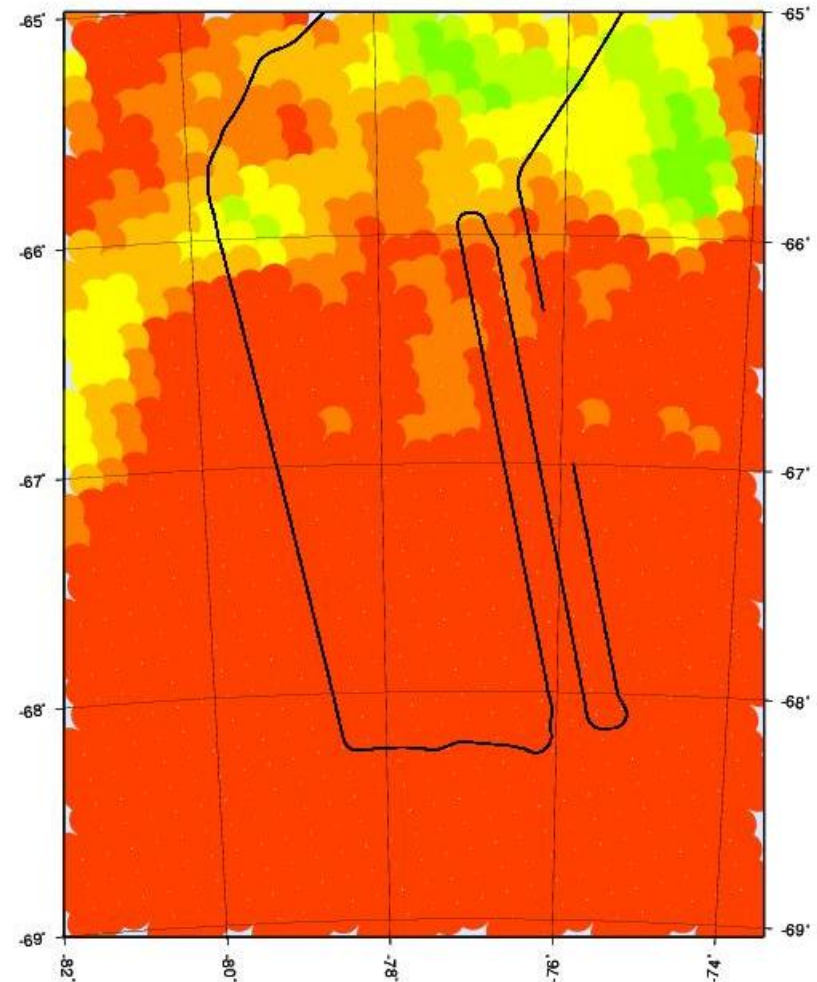
041014 Flight

- Major equipment failures during this flight
- GPS rack on P-3
 - *Intermittent power failures on both redundant GPS units through mission*
 - *Problem traced to bad power connection after the flight*
- Ground station
 - *Lost power for several hours*
 - *Data ends after about 1/2 of data lines completed*
- No precise trajectory possible



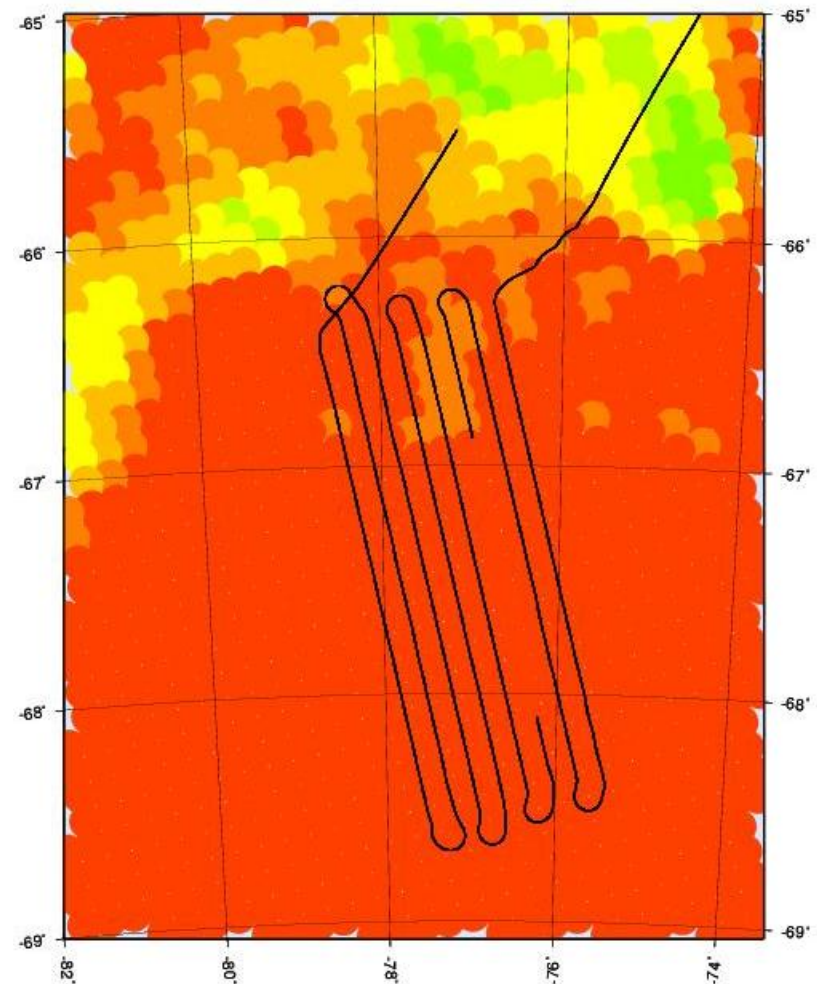
041015 Flight

- 4 data lines completed
- Precise trajectory for the mission has a 640 sec gap in easternmost line
- Gap is due to poor GPS satellite geometry during the ~11 min period
- May be possible to reduce the extent of the gap

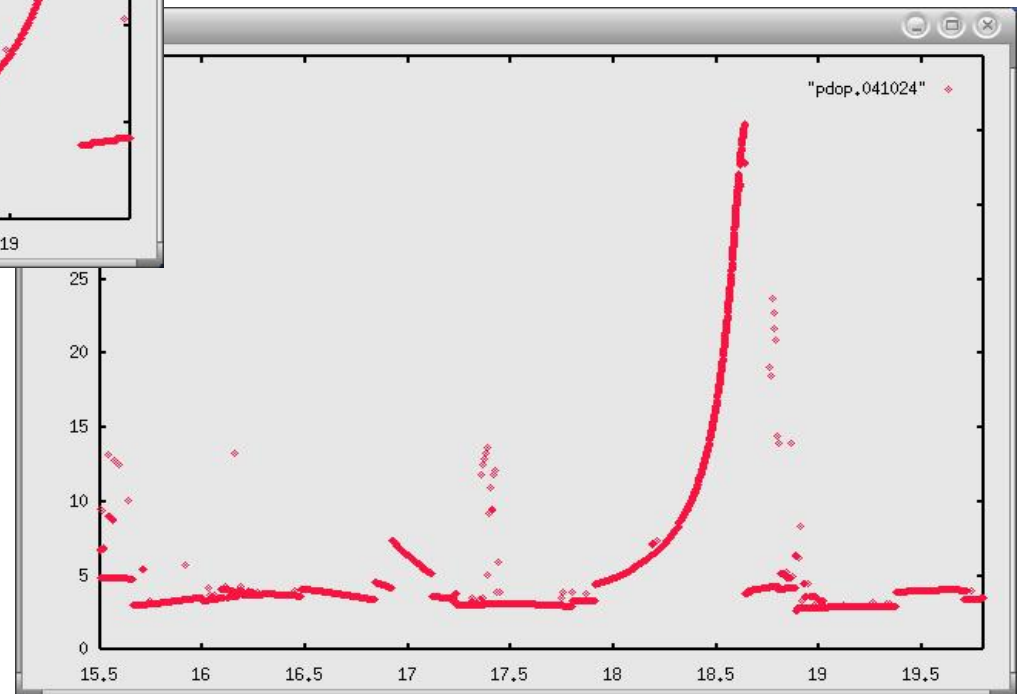
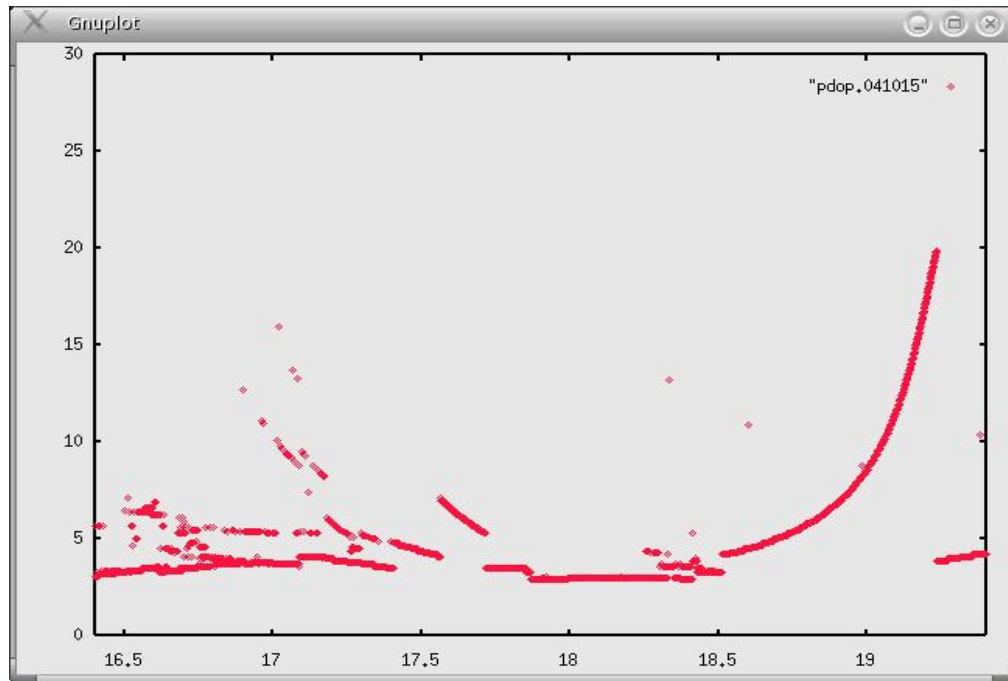


041024 Flight

- 8 data lines completed
- Precise trajectory for the mission has a 949 sec gap in one line
- Gap is due to poor GPS satellite geometry during the ~16 min period
- May be possible to reduce the extent of the gap



Why the Gaps... PDOP!



Further Work

- A precise trajectory is released when the following conditions are satisfied:
 - *Average RMS for all phase observations is low, generally about 1 cm or less*
 - *No large discontinuities in point-to-point RMS exist*
 - *Phase biases are resolved satisfactorily*
 - *Estimated tropospheric refraction parameters converge to reasonable values*
 - *Any gaps longer than a few sec are understood*
- For the three missions analyzed, all these criteria have been satisfied
- May be possible to reduce the length of the long gaps, perhaps by selectively lowering the elevation cutoff angle of certain satellites during the gaps